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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/629,163	07/31/2000	HANY M. AZIZ	105433	4806

7590 07/10/2003

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EXAMINER	
ZIMMERMAN, GLENN	
ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 07/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/629,163	AZIZ ET AL.	
	Examiner	Art Unit	
	Glenn Zimmerman	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 April 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 July 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

Amendment, filed on April 30, 2003, has been entered and acknowledged by the examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Shinar et al. U.S. Patent 5,352,906.

Regarding claim 1, Shinar discloses an organic light emitting device **(title; col. 3 lines 9-12)**, comprising: An anode **(ITO second electrode Fig. 1 ref. 9)**; a cathode **(base electrode ref. 7)**; and a light emission region **(EL polymer layer ref. 1)** that emits light disposed between the anode and cathode, the light emission region including an organic light emitting material **(col. 3 lines 9-12)**; wherein the organic light emitting device is an annealed structure with an annealing temperature from about 60 to 100 degrees C **(col. 9 lines 13-14; col. 3 lines 60-62)**, with an annealing time from about

0.25 hours to about 25 hours **(col. 9 lines 16-18; col. 3 lines 60-62)**, and heating and cooling rates from about 0.5C/min to 20 C/min **(col. 11 lines 31-35)**.

Regarding claims 2 and 3, Shinar discloses the organic light emitting device of claim 1, wherein the organic light emitting device is formed by annealing the organic light emitting device at a temperature and for a period of time effect to (i) decrease an operating voltage of the organic light emitting device **(col. 9 line 32)**, and (ii) increase an energy conversion efficiency of the organic light emitting device **(col. 9 lines 25-30 and col. 9 lines 39-41)**.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Epstein et al. U.S. Patent 6,235,414 in view of Shinar et al. U.S. Patent 5,352,906.

Regarding claim 1, Epstein et al. teach an organic light emitting device, comprising : an anode **(electrode (ITO) ref. 3)**; a cathode **(electrode (Al) ref. 1)** ; and a light emission region **(emissive polymer(s) Fig. 1b ref. 5)** that emits light disposed between the anode and cathode, the light emission region including an organic light

emitting material **(polyphenylene or polyfluorene and blends col. 4 lines 10-25)**, but fail to teach wherein the organic light emitting device is in an annealed structure with an annealing temperature from about 60° to 100°C, with an annealing time from about 0.25 hours to about 25 hours, and heating and cooling rates from about 0.5°C/min to 20°C/min. Shinar et al. in the analogous art teach wherein the organic light emitting device is in an annealed structure with an annealing temperature from about 60° to 100°C **(col. 3 lines 60-62; col. 9 lines 13-14)**, with an annealing time from about 0.25 hours to about 25 hours **(col. 9 lines 16-18)**, and heating and cooling rates from about 0.5°C/min to 20°C/min **(col. 11 lines 30-35)**. Additionally, Shinar et al. teach incorporation of such annealing conditions to improve the operating lifetime and reduction in the EL threshold voltage i.e. the initial voltage at which the electroluminescence occurs, by at least about 20% **(col. 3 lines 52-62)** and also to improve the catastrophic failure rate of the prepared diodes by at least about 2%, preferably at least about 10% **(col. 9 lines 10-12)** and also provide for a annealing cooling and heating rate where the final product will retain the benefits of the constant heating and time portion of the annealing treatment **(col. 11 lines 30-35 and 58-60)**. The examiner also considers the heating and cooling rates of column 11 lines 30-35 as part of the annealing treatment of column 9 line 22.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have wherein the organic light emitting device is in an annealed structure with an annealing temperature from about 60° to 100°C, with an annealing time from about 0.25 hours to about 25 hours, and heating and cooling

rates from about 0.5°C/min to 20°C/min in the organic light emitting device of Epstein et al. since such a modification would improve the operating lifetime and reduction in the EL threshold voltage i.e. the initial voltage at which the electroluminescence occurs, by at least about 20% and also to improve the catastrophic failure rate of the prepared diodes by at least about 2%, preferably at least about 10% and also provide for an annealing cooling and heating rate where the final product will retain the benefits of the constant heating and time portion of the annealing treatment as taught by Shinar et al.

Regarding claim 2, Epstein et al. teach all the limitations of claim 2, but fail to teach formed by annealing an organic light emitting device at a temperature and for a period of time effective to (i) decrease an operating voltage of the organic light emitting device, and (ii) increase an energy conversion efficiency of the organic light emitting device. Shinar et al. in the analogous art teach annealing an organic light emitting device at a temperature and for a period of time **(col. 3 lines 52-62; col. 11 lines 30-35)**. Additionally, Shinar et al. teach incorporation of such an annealing to improve the operating lifetime and reduction in the EL threshold voltage i.e. the initial voltage at which the electroluminescence occurs, by at least about 20% **(col. 3 lines 52-62)**. Note the time and temperature ranges mentioned by Shinar et al. for annealing include 24 hours and 100 degrees C and the cooling and heating rates, which match with the applicant's specification time for achieving the limitations (i) and (ii) of the claim 2.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use annealing in light emitting device of Epstein et al. since such a modification would improve the operating lifetime and

reduction in the EL threshold voltage i.e. the initial voltage at which the electroluminescence occurs, by at least about 20% as taught by Shinar et al.

Regarding claim 3, Epstein et al. teach all the limitations of claim 3, but fail to teach annealed at a temperature and for a period of time effective to (i) decrease the operating voltage of the organic light emitting device by at least about 10%, and (ii) increase the energy conversion efficiency of the organic light emitting device by at least about 10%. Shinar et al. in the analogous art teach annealed at a temperature and for a period of time **(col. 3 lines 52-62; col. 9 lines 25-30 and 38-44; col. 11 lines 30-35)**. Additionally, Shinar et al. teaches incorporation of such an annealing time and temperature to improve the operating lifetime and reduction in the EL threshold voltage i.e. the initial voltage at which the electroluminescence occurs, by at least about 20% and improve EL efficiency the **(col. 3 lines 52-62; col. 9 line 39)**.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use the annealing time and temperature in the light emitting device of Epstein et al. since such a modification would improve the operating lifetime and reduction in the EL threshold voltage i.e. the initial voltage at which the electroluminescence occurs, by at least about 20% and improve EL efficiency as taught by Shinar et al. Note the time and temperature ranges mentioned by Shinar et al. for annealing include 24 hours and 100 degrees C and the cooling and heating rates, which match with the applicant's specification time for achieving the limitations (i) and (ii) of the claim 3.

Regarding claims 7 and 4-6, Epstein et al. disclose the organic light emitting device of claim 1, wherein the light emission region comprises:

A mixed region including a mixture of a hole transport material and an electron transport material **(col. 3 lines 65-67; col. 4 lines 1-25)**; and at least one of (i) a hole transport region between the anode and the mixed region **(polyaniline redox polymer layer Fig. 1(b) ref. 6; col. 4 lines 26-32 and 60-67)**; and (ii) and electron transport region **(polyaniline acid redox polymer layer ref. 7; col. 5 lines 1-9)** between the cathode and the mixed region; wherein at least one of the hole transport region, the electron transport region and the mixed region emits light.

All the transport layers are made of polyaniline so they all emit light.

Regarding claims 8 and 9-12, Epstein et al. disclose the organic light emitting device of claim 7, wherein the light emission region comprises **(polyphenylene or polyfluorene and blends col. 4 lines 10-25)** a material selected from the group consisting of polyphenylenes, polyphenylvinylenes, polyfluorenes, polypyrroles, polyanilines and derivatives thereof.

Regarding claim 13 and 14-17, Epstein et al. disclose the organic light emitting device of claim 7, wherein the light emission region comprises a material selected from the group consisting of metal oxinoids **(AlQ_3)**, aromatic tertiary amines, indolocarbazoles, triazines, stilbenes, anthracines, oxadiazole metal chelates, porphyrins, and derivatives thereof **(col. 4 lines 40-55)**.

Regarding claims 18 and 19-21, Epstein et al. disclose the organic light emitting device of claim 7, wherein the hole transport material is selected from the group

consisting of aromatic tertiary amines and indolocarbazole compounds **(4'-diamine col. 4 lines 40-55)**, and the electron transport material is selected from the group consisting of metal oxinoids **(AlQ_3)**, triazines, stilbenes, oxadizole, metal chelates and derivatives thereof **(col. 4 lines 40-55)**.

Regarding claims 22 and 23-25, Epstein et al. disclose the organic light emitting device of claim 22, wherein the hole transport material is a naphtyl-substituted benzidine derivative or indolocarbazole compound **(4'-diamine; N'-diphenyl-N; N'-bis(3-methylphenyl)-1; col. 4 lines 40-55)**, and the electron transport material is tris (8-hydroxylquinoline) aluminum **(AlQ_3 ; col. 4 lines 40-55)** or bis(8-hydroxyquinolato)-4-phenylphenolato)aluminum.

Regarding claim 26, Epstein et al. disclose the organic light emitting device of claim 1, wherein the device emits light having a wavelength of from about 400 nm to about 700 nm **(Fig. 4, 8 and 9)**. It is the position of the examiner that the claimed functional language "wherein the device emits light having a wavelength of from about 400 nm to about 700 nm" is inherent to the claimed structure. See the instant specification.

Regarding claim 27, Epstein et al. disclose the organic light emitting device of claim 1, wherein the device operates under AC or DC driving conditions **(col. 6 lines 5-10)**.

Regarding claim 28, Epstein et al. disclose a display comprising at least one organic light emitting device according to claim 1 **(col. 3 lines 24-30; col. 2 lines 15-20)**.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Glenn Zimmerman whose telephone number is (703) 308-8991. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703) 305-4794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is n/a.

Glenn Zimmerman
July 1, 2003

ASHOK PATEL
PRIMARY EXAMINER